_JOB NO: 5041 ETT 114

BASF 5/96

	HERCULES	نہے		DES	CRIPTIO	N OF W	ORK PE	RFORME	D (BY F	OREMAN)	<u></u> .	, .	
	MARINE SERVICE CORP. FREEPORT, TEXAS	子等	0		ra	ge i							т
<u>FOI</u>	REMAN'S DAILY TIME REPORT	12.13											O T
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	5/13/96 • ETT 114	為為											*
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BADGE NO.	N A M E	5/13											
	Claudio Duarte	8/											8
	Joe Olivares	5/											5
	Sam Pettit	3/											لگ
	Jose Casas	6/						_					6
	Juan Rivera	6/								=			6
	Jaime Rodriguez	6/											6
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•	TOTAL HOURS	35							H	IER 00	467		3 3
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CODED

HERCULES MARINE SERVICES CORPORATION

P. O. Drawer O . Freeport, Texas 77541

INVOICE NO.

3403

DATE

May 31, 1996

Job No.

5041

Location

Freeport, TX

TO:

BASF 607 Copper Road Freeport, TX 77541 PLEASE REMIT PAYMENTS TO: 11011 RICHMOND

SUITE 500 HOUSTON, TX. 77042

Terms

: Net 30

FOR:

Service to the ETT 114 as follows:

Set up equipment

Strip out all free product

Blow cargo pipeline and stripping system

Vacuum blow dry cargo tanks

Sweep powder rust from cargo tank floor

Pressure test cargo pipeline 40 PSI

Clean off deck

Remove equipment

Close Barge

Nitrogen pad

Deballast bow and wing tanks

LABOR:	Foreman Journeyman	8 hr. 34 hr.	@ @	38.00 32.50	304.00 1,105.00
STOCK:	33.45	Plus 25%		9.00	43.00
EQUIPMENT:	Compressor	8	@	48.00	384.00
-	Air Movers	24	œ	5.00	120.00
	Vacuum	3	<u>@</u>	36.00	90.00
	Hand Hose	3	<u>ĕ</u>	12.00	36.00
	3" gas pump	12	<u>@</u>	18.00	216.00
	2" strip pump	8	œ	15.00	120.00

TOTAL AMOUNT DUE

\$2,418.00

PHONE: (409) 233-6371

INVOICE NO. MARINE OPERATIONS FACILITY MARINE REPAIR CUSTOMER P.O. Ċ D \$ T A T 0 E M E R ☐ YES □ NO IF YES, COMPLETE STOCK MATERIAL TRANSFER TICKET LAST PRODUCT OUTSIDE SERVICES IF YES, LIST 🔲 YES 🛴 □ NO GAS FREEING NO YES 🗍 CERTIFICATE REQUIRED HAUL OUT FOR INSPECTION AND REPAIR Y ES [] № 🗆 ON WAYS DATE: ITEM NUMBERS 8 10 THIS SHALL SERVE AS YOUR AUTHORIZATION TO PROCEED WITH THE ABOVE. ___ Date: <u>5-13-86</u>

HERCULES OFFSHORE CO.

SHIPPING ORDER

DATE ORDERED RIC Throng Monahout			Gases	ses and Equipment. Tuc. SHIPPERS ORDER NO.									
	93/70	<u>, , , , , , , , , , , , , , , , , , , </u>				1.0030.74							
	TENBY	too l	General Office: P					13/868-0333		ļ	INVOIC	E DAT	E
DATE	SHIPPED		Remit Paymen	t to: P.O. BOX 2	00411 HOU	STO	ON, TEXAS 7	7216-0411			INVO	CE NO).
SOLD	Accor Custo	unt No. omer			'	S H I P	Customer Location /	BASE Recycle 100	· Cox	1	*****	<u></u>	
ŏ	City	9.30	State	Zip		5	Services Re City	endered 🥖 .	1800	State	part.		Zip
		USTOMER ORDER NO.	and the second second	ORDERED BY		-	ORIGIN	FROM	то	TAX %	CF	EDIT	APPROVAL
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			Nitrogen Charges					<u> </u>	·			ļ.,	
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		able Transport Time	mation is correct, and the serv	ices have been com	oleted.					78.			
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		101	7 /	 /	~ 	TOTAL	minum Files	<u>- 1,74</u>	150-5 1-12	12.1.			
	1000	-d d 15	r. Ten			_	Person #	E # 114)	-		·· - ·		
Big T	hree I.N	V.S. Representative					1				HER (004	170

Inv 3403

JOB WORKSCOPE/BREAKDOWN

P 1	RASE	ARCE ETT 14
JOB NO: <u>504</u>	LL CUSTOMER: BASE 1.	MCE FOLLO
		-04 00
FOREMAN:	Srr 8 @ 38.00	s 304.00
1010111	O/f @ 53.25	
LEADMAN:	S/T @ 35.00 O/f @ 49.50	
YOU DAIGN.	O/I @ 49.50 S/I <u>25 34</u> @ 32.50	812:50 1,105.00
JOURNEY:	O/f @ 45.75	
	Slop Oil @ .60	·
DISPOSAL:	Slop Oil (a) .60 Water (a) .35	
WATER:	5.00 per 1,000 gals.	
	Div. 259/.	
MATERIAL:	Plus 25%Plus 25%	43.00
STOCK:		
EQUIPMENT:		384.00
	Compressor 24 @ 48.00 Air Movers 24 @ 5.00	120.00
	Air Movers <u>24</u> @ 5.00 Forklit @ 30.00	
	Tugboat @ 100.00	
	Steam rig (a) 100.00 (b) 30.00	90.00
.:	Vacuum 3 @ 30.00 Hand Hose 3 @ 12.00	36.00
	Weld Machine @ 15.00	
	Cherrypicker @ 70.00	
.0	Crane (ii) 130.00 3" gas pump 12 (ii) 18.00	216.00
	2" strip pump 8 (2) 15.00	120.00
	Butterworth @ 10.00	
, v.	4" Elect. Pump @ 15.00 Cutting rig	
	Cutting rig (a) 8.00 Haul Out (a) 1100.00	
	1	55 590 ·
ARRIVED:	COMPLETED:	DEPARTED:
PRODUCT:_	LOAD:	
	TOTAL INVOICE:	2, 125,50 B
		2, 125,50 B 924/8.05 HER 0047
		82410
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Strength through environmental awareness and customer service

P.O. Drawer O Freeport, Texas 77541 Office (409) 233-6371 Fax. (409) 233-6375

HQUIPMENT	HOURS USED	HOURLY RATE	TOTAL PRICE
OMPRESSOR	@ 8	44.00	
AR MOVERS	24	5.00	
ACUUM	3	20.00	
-O!LER		80.00	
BZOH CZAS	A 3	10.00	
BUTTERWORTH		10.00	
2" STRIP PUMP	8	12.00	
3" DIESEL PUMP	12	14.00	
" ELECT PUMP		15.00	
RANE		130.00	
TERRYPICKER		50.00	
FORKLIFT		20.00	
TUG BOAT	1	80.00	
y -1-1-1			
ELD MACHINE	m jagin ünder ünder geleigt. Ling jahra energiete	15.00	
TUTTING RIG	e i til som koloker gjer til sid til Som koloker	8.00	
ORK BARGE	e e e e e e e e e e e e e e e e e e e	35.00	
LAUL OUT	ja ona m a ndin. <u>2014-ya 1944-</u>	1100.00	
		er en de la grande d La grande de la grande	•
DATE: <u>5-13-86</u>	JOB NO: <u>5</u> 02	// BARGE NAME:	+t=114

HERCULES OFFSHORE CO.

ARRIVAL COMPLETION DATE DEPARTURE DATE WIDTH	SILLING MODRESS TO CITY AND STATE MORE HUMSER R STOCK MATERIAL YES NO
DEPARTURE DATE DEPARTURE DATE WIDTH	T O CITY AND STATE M E PHONE HUMSER R DURAN AUTHORIZED BY O/T AUTHORIZED BY
E 533114	M E PHONE HUMBER R DIT AUTHORIZED BY
WE E 33 114.	P. Perend of Authorites at
WE E 33 114.	h. Perera
	STOCK MATERIAL YES NO
REWAN	
	IF YES, COMPLETE STOCK MATERIAL TRANSFER TICKE
ST PRODUCT	OUTSIDE SERVICES YES NO
YES - YES -	IF YES, LIST
S FREEING NO CERTIFICATE REQUIRED NO	
LUL OUT FOR INSPECTION AND REPAIR YES [] NO []	
I WAYSDATE:	
I WAYS DATE:	
ITEM	NUMBERS
	
Kinallast , Strip ario	L blow, nitrogen pad
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4.	

HERCULES OFFSHORE CO. INVOICE NO. MARINE OPERATIONS FACILITY MARINE REPAIR ORDER No. ________ CUSTOMER P.O. C DARRIVA S O M ER ă STOCK MATERIAL **□**,Y **E**8 □ NO IF YES, COMPLETE STOCK MATERIAL TRANSFER TICKET OUTSIDE SERVICES IF YES, LIST ☐ YEŞ □ NO GAS FREEING NO YES 🗍 CERTIFICATE REQUIRED NO 🗀 HAUL OUT FOR INSPECTION AND REPAIR YES 🗍 ио 🗀 ON WAYS DATE: ON WAYS DATE: ITEM NUMBERS Dehallast , strip and blow, notingen pad 2 3 4 5 6 7 8 10 THIS SHALL SERVE AS YOUR AUTHORIZATION TO PROCEED WITH THE ABOVE.

Date: -

Signed: .



Strongth through experience, equipment, know-how
P.O. Drawer O Office: (409) 233-6371
Freeport, Toxas 77641 Fax: (409) 233-6375

FINAL CHECK LIST

DATE: 5-13-86		
HARCE: Extelly		
BLND NUMBER CHECKED 2	_REPLACED CASKET	YESNO
CATE VALVE NUMBER CHECKED 6	REPLACED CASKET	YES NO:
PLUCS NUMBER CHECKED /	REPLACED PLUC	YES NO
CHECK VALVE NUMBER CHECKED WA	REPLACED CASKET	ONZIY
DEEPWELL BLIND NUMBER CHECKED NA	REPLACED CASKET	YESNO
BELOW DECK CARCO PIPELINE BLIND NUMB	DER #/4 REPLACED CA	veket aes no
BELOW DECK CARGO PIPELINE BLIND REMO	OVED YES NO	•
DRIP PANS VALVES: CLOSED BY CO	145	
DRIP PANS COVER: CLOSED BY CA		<u>_</u>
COMTAINMENT ARE, PLUG OR VALVES:	CLOSED BY MA	 ;
AIR TEST CARCO LINE - 40psi - USING	SOAP	
SIGNATURE OF TESTER: Chille Dec	inter	
WITNESS: Thuera 1		
*		
* CHECK VALVE CASKET WILL BE REPLACE * AIR TEST IS LAST THING TO BE DONE		ARCE.

DECLARATION OF INSPECTION

lo difficial di de Maria

PROOR TO HOLK CA	·	A	
VESSELS			·
			<u></u>
TRANSFER FACILITY			
LOCATION FREEPORT TX.			
The following list refers to requirements set forth in			
on reverse). Tr) spaces adjacent to items on the list are pr	ovided to indicate th	tut the detailed	i requirement has
		DELIVERER	RECEIVER
1. Communication System/Language Fluency (156.120)	(m) (p))	/	
2. Warning Signs and red Warning Signals. (35.35-30)	i .		
3. Vessels Moorings, (156.120 (a))	i		
Transfer System Alignment (156.120 (d))			
5. Trensfer System; unused components. (156.120 (c))	ľ		
d. Transfor Systems; fixed piping. (188.120 (f))			
7. Overboard Discharges/See Suction Valves. (15d.120 (g))	,		
8. Hours or Loading Arms condition. (158.120 (f) (158.170)	J ⁻		
0. Hoses; length and support. (15d.120 (b) (c))	}		
10. Connections (186130)			
11. Discharge Contsinment Systems (188.120 (j) (h)	<u> </u>		
13t. Sonppars or Draine. (184120 (k))			
13. Kalanganay Shiidown (100.120 (n)	ľ		
- 14 Repair Work Arthorhesticat. (\$8.35.80)		N/A	N/A
* In. Boller and Calley Fires Safety. (35.35-30)	}	N/A	N/A
* 16. First or Open Flames (M.36-30)	[N/A	N/A
17. Lighting (squaret to sunrise). (156.120 (t))	ĺ	7	
- 18. Sulu Smoking Spaces. (38.35-30)]*		
10. Spill and Frangency shutdown procedures, (158.120 (c	ט		
20, Sufficient Personnel. (156.120 (e) (e))			
21. Transfer Conference. (186.120 (q)):			
II. Agreemant to begin transfer. (186.120 (r))	j		
I do eartily that I have pursonally inspected this facility	or variable with rules	the man	erlande anne a district d
on reverse and ther opposite each of them I have indicated the	at the regulations has	e peer combit-	d with
Ferson in Charge Recording Unit	TITLE	: Trus	LA DATE
When but	Dreman	5-1	3-2X= R-041
		- - 2	
Person in Charge Delivering Unit		_ _ ;	
	L PERSON		
Wheeler Deept		-	
THE COMPLETED 25-16-96- 3-30			

" Rules and Regulations for Tank Vessels.

HER 00476

DARGE CLEANING REPORT BARCE NO. Etteliu DATE/TIME ARRIVAL 6-12-56-2:30A CUSTOMER BASE DATE/TIME STARTED < 13-96-8 PRODUCT CYCLOHOLA DATE/TIME COMPLETE 5/2-86 AMOUNT STRIPPED 300 CLEANING ISTRUCTION BY: COMPLETION SCHEDULE BY: Pobert Potor OVERTIME AUTHORIZED BY: BARGE INSPECTED BY: DATE/TIME: BARGE RELEASED TO: DATE/TIME: DEEPWELL OPENED: YES MANO CLOSED BY NEW CASKET BELOW DECK CARGO PIPELINE: BLIND OPEN YES NO Z___CLOSED BY NEW CASKET DECK CHECK VALVE OPENED: YES NO CLOSED BY DECK HEADER BLINDS OPEN: Men INSPECTED BY CALER BRETT DECK HEADER DRAIN PLUC OPEN: YES NO CLOSED BY VAPOR RECOVERY HEADER OPENED: YES NO CLOSED BY RUST SCALE: YES NO WASHED OUT BUCKETED OUT NUMBER OF CARC TANKS 3 CONDITION OF CARGO VALVES GOD SLOP TANK STRIPPED: YES WA NO DRIP PANS STRIPPED: YES NO WEATHER: TEMP 90 RAIN FOC HUMIDITY OVERCAST CLOUDY CLEAR -PIPELINE WASHED: PIPELINE BLOWN ME INSPECTED BY CALEB BRETT BOW RAKE CHICKED: YES NO STERN RAKE: YES NO VOIDS: YES -SAFETY EQUIPMENT USED: NOTICE All barges cleaned for BASF will be inspected by Caleb Brett. The inspector will

have paperwork for the Hercules foreman in charge to sign. The forman will put two copies in the document mail box. One copy will stay in the mailbox, and the, captain of the tugboat that is picking up the barge will not be called until inspection is completed and documentation is in the mailbox. If any problems, BASF logistics representative must be contacted.

Inspected 5 A Time Out

NO BASE BARGE THAT HAS BEEN CLEANED WILL BE RELEASED UNTIL CALEB BRETT HAS SIGNED THE RELEASE PAPERS. CALFR BRETT WILL BE CIVEN A COPY OF THIS FORM.

HER 00477

Inchcape Testing Services Caleb Brett

TIME LOG

YOUR REFERENCE	•
OUR REFERENCE	

<u>: 114</u>		N. Butanol Hortzerminal Date
		·
YAC	HOUR	EVENT
į Tr	1325	- Introduction Notifiers
	1350	Inspector Arrives - House
	1400	COMMENCED BAKE PRETERINGS
•	14115	Completed BARGE PRETING STORY
	1425	Paperawark compilete
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Inchcape Testing Services

.Caleb Brett

VISUAL TANK INSPECTION REPORT

YOUR REFERENCE	
OUR REFERENCE	

ETT-114	M. Buta	WO.	HOSCUL.	->-FOF	T, 78007	DATI	5-13-9	Ģ	
Tank Number	1,2,3 com	·						·	
Tank Coating	nild Steat			€.					
Last Cargo	Cyclo								
Second Last Cargo	Cyclo.					·			
Third Last Cargo	Cyclo								
	5-13-16C 1415								
Visual Cleanliness Accepted/Rejected*						· .			
Reason for Rejection									

· <u> </u>		
	TK#1,33	BULLIANESHIR DESCRIPTION OF THE SECOND PROBLEM OF THE SECOND PROBL
Method said to	TK#	blown dry with nik for others.
have been used	TK#	
to clean tanks:	TK#	
	TK#	
	TK#	
<u> </u>	TK#	Unde Cat

Information regarding previous cargoes, tank coating and cleaning method was obtained from vessel personnel and cannot be guaranteed as accurate by Caleb Brett U.S.A., Inc. and no liability can be assumed for errors resulting from improper information supplied. This report, of necessity, is based on such information.

* The cleanliness of inspected tank(s) is/are based on visual inspection of tank surfaces and line system at accessible areas only. This document does not cover the cleanliness of tank surfaces and line system at inaccessible spots and/or possible release of components of previous cargoes during loading, discharge or transport of the cargo in question, for which the vessel is fully responsible. Suitability of tank coating for intended cargo must be guaranteed by vessel's owner or by suppliers of the coating.

Form # 2-056-94

FOR CALEB BRETT

HER 00479

Page 1 of 2

BYTYEDS CONDIONICATION BATHDIED OSTA 1910.1200

EMPLOYER BELANDOOR METERIALS TRAINING

	THE PARTY OF THE P
Dute 5-13-92	CLANDORS MATERIALS TRAINFING PROCEASH
Hercupe	Supervi
Aris Sta Free DOCK	Supervisor
E to the DOCK	Client Safety
4/12/14	The state of the s
The forter	
.vitowing listed material.	
working in this area.	are considered to be hazardous to the employ
Cyclous	negardous to the employ
CHCIOHENDHE	A
	<u> </u>
-	
The earl	n this area have been informed of the hazardou
employees assigned to the	
material, in work In	This area have
in this area, the	have been informed as
of harard.	rds they proceed the hazardon
Lated a	Present
the necessity	to the works
it is locared the protective	equipment to the workers, the location
it is located, and protective	equipment that he
it is located, and protective	equipment that he
it is located, and protective	equipment that he
it is located, and protective	equipment that he
it is located, and protective	equipment that he
it is located, and procedures to b I have received the training listed form. NAME	e equipment that has been provided and where the followed in case of an accidental exposure. It above and will so designate by signing this
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it is located, and procedures to b I have received the training listed form. NAME DADGE ROSSE ROSSES	e equipment that has been provided and where the followed in case of an accidental exposure. I above and will so designate by signing this
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it is located, and procedures to b I have received the training listed form. NAME DADGE Past A Casas Junilar Bedgan	e equipment that has been provided and where se followed in case of an accidental exposure. d above and will so designate by signing this
it is located, and procedures to b I have received the training listed form. NAME DADGE Past A Casas Junilar Bedgan	e equipment that has been provided and where se followed in case of an accidental exposure. d above and will so designate by signing this
it is located, and procedures to b I have received the training listed form. NAME DADGE Past A Casas Junilar Bedgan	equipment that has been provided and where the followed in case of an accidental exposure. It is above and will so designate by signing this ways. NAME BADCE
it is located, and procedures to b I have received the training listed form. NAME DADGE Past A Casas Junilar Bedgan	e equipment that has been provided and where se followed in case of an accidental exposure. d above and will so designate by signing this

CYCLOHEXANE, 98%

P

DANGER

EXTREMELY FLAMMABLE · VAPORS MAY IGNITE EXPLOSIVELY, POSSIBLE ASPIRATION HAZARD.

DANGER: CONTAINS BENZENE - CANCER HAZARD. Benzene is a known human carcinogen - overexposure may create cancer risk, blood changes or chromosome changes. Benzene has caused fetal death in animals.

PRECAUTIONS:

Keep away from heat, sparks and flame. Keep container closed. Use with adequate ventilation. Avoid contact with eyes, skin or clothing. Wash thoroughly after handling. Launder contaminated clothing before reuse. Do not swallow. May be aspirated into the lungs.

FIRST AID

In case of contact, flush eyes with water. Flush skin with water for 15 minutes. If inhaled, remove from exposure. If breathing is difficult, give oxygen, seek medical attention. If swallowed, do not induce vomiting. Seek immediate medical assistance. NOTE TO PHYSICIAN: Gastric lavage using a cuffed endotracheal tube may be performed at your discretion.

FOR ADDITIONAL INFORMATION, SEE MATERIAL SAFETY DATA SHEEY.

MANUFACTURED BY
PHILLIPS 66 COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OK 74004
UNITED STATES OF AMERICA

FORM 12500-S 10-89

AIR LIGHTDE AMERICA CCRPCRATION P. C. ECX 3647 HOUSTON: IX 77253

CATA SHEET SAFETY MATERIAL

I-SENERAL INFERMATILN

PROLLET NAME NITREGEN. REFRIGERATED LICUID

EMERGENCY TELEPHONE NO. 713-466-0302 MANUFACTURERS NAME AIR LIQUIDE AMERICA CORP. TRACE NAME/SYNCHYMS LIQUID NITRUGEN (LIN)

CHEMICAL NAME AND SYNGNYMS
ALTRUGEN, REFRIGERATED LIGHTER
REVISION DATE: 08/24/89
PROD PRODUCT IC. UN 1977 FERMULA CAS NUMBER 7721-37-4

CHENICAL FAMILY INERT GAS

**** SECITON NOTES *******

MSGS INFERMATIEN NUMBER: (713) 896-2140

II-HAZAROGUS INGREDIENIS

HAZARUEUS MIXIURES EF LIGHTES AND GASES

C/C 11.7

NITROGEN ** NONE ESTABLISHED

100

111-PHYSICAL DATA

BCILING PCINT -32C.4F (-195.8C) & LAIM SPECIFIC GRAVITY (H2G = 1): G.8083 & BCILING PT. & 1 ATM MAFCH PRESSURE N/A PERCENT VCLATILE BY VCLUME (G/O) N/A CENSITY 5C.49 LB/CU FT & BUILING PT. & 1 ATM EVAPCRATION RATE N/A SCLUBILITY IN MATER N/A MATERIAL AT NORMAL CONCITION LIQUID EXPRESSION FOR A CONCITION LIQUID EXPANSION KATIO (LICUID TO GAS) 1.656.5

APPEARANCE AND CLUR

CELERLESS. CECRLESS GAS

IV-FIRE AND EXPLOSION HAZARL LAIA

FLASH PEINT N/A FLASH PLINT (METHOD USED) FLAMMABILITY LIMITS IN AIR (U/O BY VEL) LOWER N/A

LPPER N/A

EXTINGUISHING MECIA

MATERIAL IS NONFLAMMABLE. NITROGEN NEITHER BURNS NOR SUP-PORTS COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURRELINUING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

NUNE. NITROGEN WILL ACT AS A SIMPLE ASPHYXIANT IT IT CIS-PLACES CXYGEN. LIQUID NITROGEN WHEN SPILLED WILL VAPORIZE RAPTOLY CAUSING A VAPOR CLOUD THAT WILL CREATE AN CXYGEN-GEFICIENT AIMOSPHERE. EVACUATE THE AREA OF THIS VAPOR CLOUDLESS WEARING SELF-CUNTAINED BREATHING APPARATUS. VAPOR CLOUD

LNUSUAL FIRE AND EXPLUSION HAZARD

CUNTACT WITH "COLD" LICUID OR GASECUS NITROGEN MAY CAUSE PROSTRITE. VISIBILITY MAY BE GRECURED IN THIS "VAPOR CLUUM".

AUICIGNITION TEMPERATURE: N/A

AIR LIQUIDE AMERICA CERPLRATION ... HOUSION: IX 77253

PRODUCT NAME NITROGEN. REFRIGERATED LIQUID

ELECTRICAL CLASSIFICATION: NUNHAZARUOUS

V-HEALTH HAZARE CATA

THRESMOLD LIMIT VALLE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

SEE EVEREXPOSURE SECTION

CARCINCGENICITY

NET LISTED BY TARD. NIP, USHA

ALLIES OF EXPOSURE

INHALATION. EYE/SKIN CONTACT

EFFECTS OF CVEREXPOSURE

NITEGEN IS NONTOXIC. BUT MAY CAUSE SUFFICIATION BY DISPLACING THE CAYGEN IN THE AIR. EXPOSURE TO GAYGEN-DEFICIENT ATMUSPHERES MAY CAUSE DIZZINESS. NAUSEA. VGMITING. DIFINISHED MENTAL ALERTNESS. LOSS OF CONSCICUSNESS. AND DEATH. IT SHOULL BE RECLONIZED THAT COLLAPSE AND ASPHYXIATION MAY OCCUR MITHOUT EXPERIENCING ANY OF THE ABOVE SYMPTOMS. PROLICINGED EXEATHING OF VERY COLD ATMOSPHERES CAN CAUSE LUNG CAMAGE AND HYPOTHERMIA. FROZEN TISSUES. CAUSED BY FROSTEITE ARE PAINLESS AND APPEAR MAXY WITH A PUSSIBLE YELLOW COLOR. THEY MILL BECOME SWOLLEN. PAINFUL. AND PRONE TO INFECTION MEEN THANES.

TUXILCLEGICAL PROPERTIES.

NITREGEN IS A SIMPLE ASPHYXIANI.

CONTACT AITH COLD LIQUID OR PIPING MAY CAUSE COLD CONTACT BURNS, "FROSTETTE".

EMERGENCY AND FIRST AID PROCEDURES

PERSONS SUFFERING FROM LACK OF CXYGEN SHOULD BE MOVED INTO FRESH AIR. IF VICTIM IS NOT BREATHING. AUMINISTER ARTI-FICIAL RESPIRATION. IF BREATHING IS DIFFICULT. ADMINISTER GXYGEN. COTAIN PROMPT MEDICAL ATTENTION.

SELF-CONTAINEC BREATHING APPARATUS MAY BE REQUIRED FOR RES-CUE WORKERS.

IF CONTACT WITH CRYOGENIC LIQUID NITHOGEN HAS CAUSED FROST-BITE. DO NOT HUB THE AFFECTED AREA. AS TISSUE CAMAGE MAY COOUR. FLUSH THE AFFECTED AREAS WITH WARM WATER. DO NOT USE HOT WATER. OBTAIN PROMPT MEDICAL ATTENTION.

VI-REACTIVITY DATA

STABILITY STABLE

CONDITIONS TO AVOID

NCNE.

INCOMPATABLLLITY (MATERIALS TO AVOID)

NENE.

HAZARUGUS GECUMPOSITION PRODUCTS

NCNE.

PRODUCT NAME NITAGEN, REFRIGERATED LIQUID

HAZARCOUS POLYMERIZATION WILL NOT COLUR

CUNDITIONS TO AVEID

NONE .

VII-SFILL OR LEAK PROCEEURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVALLATE ALL UNNECESSARY PERSONNEL FROM VAPOR CLOUD AREA MEERE AN OXYGEN-DEFICIENT ATMOSPHERE IS PROBABLE. SHLT OFF NITROGEN SUURCE IF POSSIBLE. AVOID CONTACT WITH LIGHTO ATTROUGH OR ITS COLD BOTH-OFF GAS. TO INCREASE RATE OF EVAPORATION SPRAY WITH LARGE AMOUNTS OF WATER FROM UPWING. IF LEAKING FROM CONTAINER OR CONNECTION. CONTACT THE CLOSEST BIG THREE INCUSTRIES ECCATION. OR YOUR SUPPLIER. SELF-CONTAINED BREATFING APPARATUS WILL BE REQUIRED IN CXIGEN-DEFT-LIENT AREAS SUCH AS NITROGEN VAPOR CLUUDS.

WASTE DISPUSAL METHER

DC NLT ATTEMPT TO GISPOSE OF RESIDUAL OF UNUSED CUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY GISPOSAL, ALLOW LICUIG MITROGEN TO EVAPORATE IN A WELL-VENTILATED CUTOCOR LOCATION.

VIII-SPECIAL PROTECTIVE INFERMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

USE SELF-CLATAINED BREATHING APPARATUS OR POSITIVE PRESSURE AIR LINE WITH MASK IN OXYGEN-DEFICIENT ATMOSPHERES. RESPIRATORS WILL NOT FUNCTION.

VENTILATION

SEE NUTES

PROTECTIVE GLOVES

LUGSE-FITTING THERMAL INSULATED/LEATHER

EYE PROTECTION

FULL FACE SHIELD AND SAFETY GLASSES ARE RECUMENDED AFEN HANDLING NO LIQUID

CTHER PROTECTIVE ECUIPMENT

LUNG SLEEVE SHIRT FOR LIGUID HANDLING. SAFETY SHOES IF HANDLING CYLINDERS.

******** SECTION NOTES *******

ABECLATE TO AVOID LOWERING DXYGEN CONTENT TO BELOW 19.5 \$ (GXYGEN-CEFICIENT ATMOSPHERE).

LCCAL EXHAUST. YES MECHANICAL: YES

IX-SPELIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND SIGRING

HER 00484

AIR LIQUICE AMERICA CCRPCRATION P. C. BEX 3047 HOUSTON: IX 77253

MATÉRIAL SAFETY CATA SHEET NITROGEN, REFRIGERATED LICUID PRECEDET NAME

SICRE AND USE WITH ADEQUATE VENTILATION. CONTAINERS SHOULD BE SICRED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKEL OVER. PROTELT CONTAINERS FRUM PHYSICAL CAMBE; LO NOT DRAG. ROLL. SLIDE. OR DROP. USE A SUITABLE HAND TRUCK FOR CONTAINER MOVEMENT. LIGHTO CONTAINERS (I.E.. 4L CYLINGERS) WILL VENT NITROGEN IF INTERNAL PRESSURE BUILDS UP. SO THESE CONTAINERS SHOULD BE STORED IN WELL-VENTILATED AREAS. AKÉAS.

C.L.I. LABELING

NONFLAMMABLE GAS - GREEN LABEL

VALVE CLANECITON

295 FCR LIGUID, 580 FOR GAS

CIHER PRELACTIONS

LIGHT NITREGEN EXPANDS AT A RATIC OF 690.5 IC 1. AND IF IRAPPED IN A CONTAINER OR PIPE. IT WILL PRODUCE ENCRACES PRESSURES ANICH WILL RUPIURE THE CONTAINER. ANY AREA WHERE LIGHT NITREGEN COULD BE TRAPPED MUST BE PROTECTED BY A PRESSURE RELIEF DEVICE. PIPING MUST BE DESIGNED FOR EXTREME COLD. MANY MATERIALS. SUCH AS CARBON STEEL. WILL BECOME EXITLE AND MAY FRACTURE WHEN EXTREMELY COLD. BO NOT TOUCH OLD PIPING AS FROSTBITE MAY OCCUR.

DUT FLACARD: NONFLAMMABLE GAS

CCT PROPER SHIPPING NAME: NITROGEN: REFRIGERATED LICUID

MISCELLANEGUS INFERMATION:

FUNTHER INFORMATION ABOUT LIQUID NITRUGEN CAN BE FOUNC IN THE FOLICHING PAPPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGIGN. VA 22202 1763) 979-4341

L: "CLMPCDITY SPECIFICATION FOR NITROGEN"
"SAFE HANCLING OF COMPRESSED GASES IN CONTAINERS"
"THE THERT GASES ARGON, NITROGEN, AND FELTUM"
"SAFE HANCLING OF CRYOGENIC LIQUIC"
"ACCICENT PREVENTION IN GXYGEN-KICH AND GXYGENCEFTCIENT ATMOSPHERES"
"GXYGEN-DEFTCIENT ATMOSPHERES"
"SAFE HANCLING OF LIQUEFTED KITROGEN & ARGON" G-10-1: P-9: P-1∠:

S8-2: Av-5:

REPA HATINGS: REACTIVITY:

HMIS RATINGS: HÉALIF: FLAPMABILITY: REACTIVITY:

LEKCLA RATINGS: HEALTH: C FIRE REACTIVITY: PERSISTANCE:

LISTED IN ISCA INVENTURY:

PRODUCT NAME NITEGEN. REFRIGERATED LIGHT

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SCLELY FOR YOUR INFORMATION, CONSIDERATION, INVESTIGATION, IN COMPLIANCE WITH HAZARD COMMUNICATION STANDARD OF ASCOLUZOO. AIR LIGUIDE AMERICA COMP. PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED.

PAGE 1

PURCHASE ORDER E6269

MATERIAL SAFETY DATA SHEET

I-GENERAL INFORMATION

PRODUCT NAME NITROGEN

D

EMERGENCY TELEPHONE NO. 713-868-0302
MANUFACTURERS NAME AIR LIQUIDE AMERICA CORP.
TRADE NAME/SYNONYMS NITROGEN: NITROGEN NE
CHEMICAL NAME AND SYNONYMS
NITROGEN
NITROGEN
PRODUCT TO: UN

REVISION DATE: 08/24/89 CHEMICAL FAMILY INERT GAS PRODUCT ID. UN 1066 FORMULA N2 CAS FAMILY 7727-37-9

******** SECTION NOTES ******

MSDS INFORMATION NUMBER: (713) 896-2140

II-HAZARDUUS INGREDIENTS

HAZARDOUS MIXTURES OF LIQUIDS AND GASES

0 TLV

NITROGEN ## NOME ESTABLISHED 100 **

III-PHYSICAL DATA

BOILING POINT -320.4F (-195.8C) @ 1 ATM SPECIFIC GRAVITY (AIR = 1): 0.967 @ 70 F (21.1C) & 1 ATM VAPOR PRESSURE N/A PERCENT VOLATILE BY VOLUME (0/0) N/A (GAS) DENSITY 0.07245 LB/CU FT @ 70 F (21.1 C) & 1 ATM EVAPORATION RATE N/A (GAS) SOLUBILITY IN WATER 2.33SCC/100CC H20 @ 32 F (0 C) MATERIAL AT NORMAL CONDITION GAS EXPANSION RATIO (LIQUID TO GAS) N/A (GAS)

APPEARANCE AND ODOR

COLORLESS, ODORLESS, TASTFLESS GAS

IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) FLASH POINT (METHOD USED) FLAMMABILITY LIMITS IN AIR (O/O BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMABLE. NITROGEN NEITHER BURNS NOR SUPPORTS COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

NONE. NITROGEN WILL ACT AS A SIMPLE ASPHYXIANT IF IT DISPLACES OXYGEN. IF POSSIBLE, REMOVE NITROGEN CYLINDERS FROM FIRE AREA OR COOL WITH WATER TO AVOID EXCESSIVE PRESSURE BUILDUP. SELF-CONTAINED BREATHING APPARATUS MAY BE REQUIRED FOR RESCUE WORKERS.

UNUSUAL FIRE AND EXPLOSION HAZARD

2

AIR LIGUIDE AMERICA CORPORATION P. O. BOX 3047 HOUSTON: TX 77253

PRODUCT NAME NITROGEN

PRESSURE CAN BUILD UP DUE TO HEAT AND CYLINDER MAY EXPLODE IF PRESSURE RELIEF DEVICES SHOULD FAIL TO RELIEVE PRESSURE.

AUTOIGNITION TEMPERATURE: N/A

ELECTRICAL CLASSIFICATION: NONHAZARDOUS

V-HEALTH HAZARO DATA

THRESHOLD LIMIT VALUE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

≠SEE OVEREXPOSURE SECTION≠

CARCINOGENICITY

ì

NOT LISTED BY IARC. NTP, USHA

ROUTES OF EXPOSURE

INHALATION

EFFECTS OF OVEREXPOSURE

NITROGEN IS NONTOXIC. BUT MAY CAUSE SUFFOCATION BY DISPLACING THE OXYGEN IN THE AIR. EXPOSURE TO OXYGEN-DEFICIENT ATMOSPHERES. MAY CAUSE DIZZINESS. NAUSEA. VOMITING. DIMINI-SHED MENTAL ALEXTNESS. LOSS OF CONSCIGUSNESS. AND DEATH. IT SHOULD BE RECOGNIZED THAT COLLAPSE AND ASPHYXIATION MAY OCCUR WITHOUT EXPERIENCING ANY OF THE ABOVE SYMPTOMS.

TOXICOLOGICAL PROPERTIES:

NITROGEN IS A SIMPLE ASPHYXIANT.

EMERGENCY AND FIRST AID PROCEDURES

PERSONS SUFFERING FROM LACK OF OXYGEN SHOULD BE MOVED INTO FRESH AIR. IF VICTIM IS NOT BREATHING, ADMINISTER ARTI-FICIAL RESPIRATION. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. OBTAIN PROMPT MEDICAL ATTENTION.

SELF-CONTAINED BREATHING APPARATUS MAY BE REQUIRED FOR RES-CUE RORKERS.

VI-REACTIVITY DATA

STABILITY STABLE

CONDITIONS TO AVOID

NONE.

INCOMPATABILITY (MATERIALS TO AVOID)

NONE.

HAZARDOUS DECOMPOSITION PRODUCTS

NONE.

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVOID

PAGE

3

PRODUCT NAME NITROGEN

NONE.

VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FROM AFFECTED AREA. SHUT OFF SOURCE OF NITROGEN IF POSSIBLE. VENTILATE ENCLOSED AREAS OR REMOVE CYLINDERS TO AN OUTDOOR LOCATION TO PREVENT FORMATION OF DXYGEN-DEFICIENT ATMOSPHERES. IF LEAKING FROM CONTAINER OR VALVE, CONTACT THE CLOSEST BIG THREE INDUSTRIES LOCATION. OR YOUR SUPPLIER.

WASTE DISPUSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL, SECURE CYLINDER AND VENT SLOWLY TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

USE SELF-CONTAINED BREATHING APPARATUS OR POSITIVE PRESSURE AIR LINE WITH MASK IN OXYGEN-DEFICIENT ATMOSPHERES. RESPIRATORS WILL NOT FUNCTION.

VENTILATION

SEE NOTES

PROTECTIVE GLOVES

N/A

EYE PROTECTION

SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING HIGH PRESSURE CYLINDERS.

OTHER PROTECTIVE EQUIPMENT

SAFETY SHOES WHEN HANDLING CYLINDERS.

ADEQUATE TO AVOID LOWERING OXYGEN CONTENT TO BELOW 19.5 % [OXGYEN-DEFICIENT ATMOSPHERE).

LOCAL EXHAUST: YES MECHANICAL: YES

IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE AND USE WITH ADEQUATE VENTILATION. CYLINDERS SHOULD BE STORED UPRIGHT WITH VALVE PROTECTION CAP IN PLACE AND

AIR LIQUIDE AMERICA CORPORATION P. O. BOX 3047 HOUSTON. TX 77253

PRODUCT NAME NITRUGEN SAFETY DATA SHEET

FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. PROTECT CYLINDERS FROM PHYSICAL DAMAGE: DO NOT DRAG. ROLL. SLIDE, OR DROP. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 125 F. 152 C).

D.O.T. LABELING

NONFLAMMABLE GAS - GREEN LABEL

VALVE CONNECTION

580

OTHER PRECAUTIONS

NEVER STRIKE A WELDING ARC ON ANY COMPRESSED GAS CYLINDER. REFILLING CYLINDERS WITHOUT THE CONSENT OF THE CYLINDER OWNER IS A VIGLATION OF FEDERAL LAW (49 CFR).

DOT PLACARD: NONFLAMMABLE GAS

ĎOT PROPER SHIPPING NAME: NITROGEN. COMPRESSED

MISCELLANEOUS INFORMATION:

FURTHER INFORMATION ABOUT NITROGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON, VA 22202 (703) 979-4341

"COMMODITY SPECIFICATION FOR NITROGEN"
"SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"
"THE INERT GASES ARGON, NITROGEN, AND HELIUM"
"ACCIDENT PREVENTION IN DXYGEN-RICH AND OXYGENDEFICIENT ATMOSPHERES" G-10.1: P-1: " P-9: " P-14:

"OXYGEN DEFICIENT ATMOSPHERES" SB-2:

NEPA PATINGS: HEALTH: 0 FLAMMABILITY: REACTIVITY: HMIS RATINGS: HEALTH: FLAMMABILITY: REACTIVITY:

CERCLA RATINGS:
HEALTH:
FIRE:0
REACTIVITY:
PERSISTANCE: 0

LISTED IN TSCA INVENTORY: YES

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PUECHASE GROER 2024594 HV

MATERIAL SAFETY DATA SHEET

I - GENERAL INFORMATION

PRODUCT NAME OXYGEN, REFRIGERATED LIQUID

EMERGENCY TELEPHONE NO. 713-868-0302
MANUFACTURERS NAME ATR LIQUIDE AMERICA CORP.
TRADE NAME/SYNONYMS LIQUID OXYGEN (LOX)
CHEMICAL NAME AND SYNONYMS
OXYGEN, FEFRIGERATED LIQUID
REVISION DATE: 09/05/89 PRODUCT 10. UN
CHEMICAL FAMILY GXTD1ZER CAT

PRODUCT 10. UN 1073 FORMULA 62 CAS FAMILY 7782-44-7

MSDS INFORMATION NUMBER: (713) 896-2140

II-HAZARDOUS INGREDIENTS

HAZARDOUS MIXTURES OF LIQUIDS AND GASES

UXYGEN ## NONE ESTABLISHED

* * 100

IIII-PHYSICAL DATA

BOILING POINT -297.3F (-183.0C) & L ATM
SPECIFIC GRAVITY (H20 = 1): 1.14 & BOILING PT & L ATM
VAPOR PRESSURE N/A
PERCENT VOLATILE BY VOLUME 10/0) N/A
DENSITY 71.22 LB/CU FT

& BOILING PT & 1 ATM
EVAPORATION RATE N/A
SOLUBILITY IN WATER N/A
MATERIAL AT NORMAL CONDITION LIQUID
EXPANSION RATIO (LIQUID TO GAS) 1:860.6

APPEARANCE AND ODOR

PALE BLUE, COORLESS LIQUID

IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT N/A FLASH POINT (METHOD USED) FLAMMABILITY LIMITS IN AIR (0/0 BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMABLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

THOUGH NOT FLAMMABLE ITSELF. OXYGEN VIGOROUSLY ACCELERATES COMBUSTION. LIQUID OXYGEN, WHEN SPILLED, WILL EVAPORATE RAPIDLY CAUSING A VAPOR CLOUD THAT WILL BE HIGHLY OXYGEN-ENRICHED. WHICH CAN CAUSE MATERIALS IN THIS CLOUD TO IGNITE EASILY. EVACUATE THE CLOUD AREA AND REMOVE ANY IGNITION EASILY. SOURCES.

UNUSUAL FIRE AND EXPLOSION HAZARD

AIR CIDUIDE AMERICA CORPORATION P. U. BUX 3047 HOUSTON. TX 77253

PRODUCT NAME OXYGEN. REFRIGERATED LIQUID TY DATA SHEET

MATERIALS WHICH DO NOT BURN IN AIR MAY BURN IN CXYGEN-ENRICHED ATMOSPHERES WHERE THE GXYGEN CONTENT EXCEEDS 216. CXYGEN MAY FORM EXPLUSIVE CHMPOUNDS WHEN EXPOSED TO COM-BUSTIBLE MATERIALS OR DIL. GREASE. AND OTHER HYDROCARBON MATERIALS. CONTACT WITH "COLO" REFRIGERATED LIQUID MAY CAUSE FROSTRITE. VISIBILITY MAY BE OBSCURED IN THIS VAPOR CLOUD.

AUTOIGNITION TEMPERATURE: N/A

ÉLECTRICAL CLASSIFICATION: NONHAZARDOUS

V-HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

***SEE OVEREXPOSURE SECTION**≠

CARCINGGENICITY

NOT LISTED BY TARC. NTP. USHA

ROUTES OF EXPOSURE

INHALATION. EYE/SKIN CONTACT

EFFECTS OF OVEREXPOSURE

CONTACT WITH LIQUID OXYGEN CAN CAUSE SEVERE FROSTBITE AND FREEZE BURNS. PROLONGED BREATHING OF VERY COLD ATMOSPHERES CAN CAUSE LUNG DAMAGE AND HYPOTHERMIA. BREATHING BOX OR MORE OXYGEN AT ATMOSPHERIC PRESSURE FOR MORE THAN A FEW HOURS MAY CAUSE NASAL STUFFINESS. COUGH. SORE THROAT. CHEST PAIN AND BREATHING DIFFICULTY. BREATHING DXYGEN AT HIGHER PRESSURE INCREASES THE LIKELIHOGD OF ADVERSE EFFECTS WITHIN A SHORTER TIME PERIOD. EXPOSURE TO OXYGEN AT HIGHER PRESSURES FOR PROLONGED PERIODS HAS BEEN FOUND TO AFFECT VISION, NEUROMUSCULAR COORDINATION. AND ATTENTIVE POWERS.

TOXICOLOGICAL PROPERTIES:

AT NURMAL CONCENTRATION AND PRESSURE, DXYGEN POSES NO TOXI-CITY HAZARDS. HOWEVER, AT ELEVATED CONCENTRATIONS AND PRES-SURES, OXYGEN MAY CAUSE ADVERSE EFFECTS (SEE ABOVE).

EMERGENCY AND FIRST AID PROCEDURES

REDUCE DXYGEN PRESSURES TO 1 ATM AND/OR MOVE VICTIM INTO FRESH AIR.

RESCUE PERSONNEL SHOULD BE AWARE OF EXTREME FIRE HAZARDS ASSOCIATED WITH DXYGEN-ENRICHED ATMOSPHERES.

IF CONTACT WITH CRYOGENIC LIQUID CXYGEN HAS CAUSED FROSTBITE DO NOT RUB THE AFFECTED AREA. AS TISSUE DAMAGE MAY OCCUR. FLUSH THE AFFECTED AREAS WITH WARM WATER. DO NOT USE HOT WATER. USTAIN PROMPT MEDICAL ATTENTION.

VI-REACTIVITY DATA

STABILITY STABLE CONDITIONS TO AVOID

AIR LIQUIDE AMERICA CORPORATION P. O. BOX HOUSTON: TX

PRUDUCT NAME OXYGEN. REFRIGERATED LIQUID TABHEET

NUNE.

INCLMPATABILITY (MATERIALS TO AVGIO)

DXYGEN REACTS EXPEDSIVELY WITH ETHERS. ALCOHOLS. AND HYDRO-CARBON MATERIALS. KEEP DXYGEN CONTAINERS FREE OF DIL AND/OR GREASÉ.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVEID

NONE.

VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FROM VAPOR CLOUD AREA WHERE, AN OXYGEN-ENRICHED AIMOSPHERE IS FORMED. AND ELIMINATE ANY SOURCES OF HEAT OR IGNITION. SHUT OFF SOURCE OF OXYGEN IF POSSIBLE. VENTILATE AREA TO PREVENT OXYGEN-ENRICHED ATMOSPHERE. AVOID CONTACT WITH LIQUID OXYGEN OR ITS CULD BOIL-DEF GAS. TO INCREASE RATE OF EVAPORATION. SPRAY WITH LARGE AMOUNTS OF WATER FROM UPWIND. IF LEAKING FROM CONTAINER OF CONNECTION. CONTACT THE CLOSEST BIG THREE INDUSTRIES LOCATION. OR YOUR SUPPLIER.

WASTE DISPOSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL. ALLOW LIQUID OXYGEN TO EVAPORATE IN A WELL-VENTILATED. CLEAN (GREASE-FREE). DUTDOOR LOCATION. KEEP AREA FREE FROM SPARKS OR FLAMES AND ANY HYDROCARBON MATERIALS.

VILI-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

NONE .

VENTILATION

NATURAL OR MECHANICAL WHERE GAS IS PRESENT -- *SEE NOTES*

PROTECTIVE GLOVES

SEE NOTES

EYE PROTECTION

FULL FACE SHIELD AND SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING LIQUID DXYGEN.

OTHER PROTECTIVE EQUIPMENT

ATR CLUSTOE AMERICA CORPORATION P. D. BEX 3047 HOUSION: TX 77253

MATERIAL SAFETY DATA SHFFT PRODUCT NAME OXYGEN. REFRIGEFALED (1901)

LONG SLEEVE SHIET FOR LIQUID HANDLING. SAFETY SHOES IF HANDLING CYLINDERS.

LOCAL EXHAUST: SUFFICIENT TO PREVENT GXYGEN-ENKICHED ATMOSPHERES OF DVFR 21% GXYGEN.

ĞLOVES: LOCSE FITTING THERMAL INSULATED UR LEATHER. GLOVES MUST BE CLEAN AND GREASE FREE.

TX-SPECTAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE AND USE WITH ADEQUATE VENTILATION. OXYGEN IS HEAVIER THAN AIR AND LEAKING GAS CAN ACCUMULATE IN LOW AREAS OR CONFINED SPACES CAUSING AN CXYGEN-ENRICHED ATMOSPHERE. CONFIAINERS SHOULD BE STORED OPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. PROTECT CONTAINERS FROM PHYSICAL DAMAGE: DO NOT DRAG. ROLL. SLIDE OR DROP. USE A SUITABLE HAND TRUCK FOR CONTAINER MOVEMENT. LIQUID CONTAINERS (I.E.: 4L CYLINGERS) WILL VENT OXYGEN IF INTERNAL PRESSURE BUILDS UP. SO THESE CONTAINERS SHOULD BE STORED IN WELL-VENTILATED ARFAS. BULK OXYGEN STORAGE MUST MEET EXPOSURE SEPARATION REQUIREMENTS OUTLINED IN NEPA PAMPHLET 50.

D.O.T. LABELING

OXYGEN -- YELLOW LABEL

VALVE CONNECTION

440 FOR LIQUID: 540 FOR GAS

OTHER PRECAUTIONS

LIQUID OXYGEN EXPANOS AT A RAILU OF 860.6 - 1. AND IF TRAPPED IN A CONTAINER OR PIPE. IT WILL PRODUCE ENDRHOUS PRESSURES WHICH WILL RUPTURE THE CONTAINER. ANY AREA WHERE LIQUID DXYGEN COULD BE TRAPPED MUST BE PROTECTED BY A PRESSURE RELIFF DEVICE. PIPING MUST BE DESIGNED FOR EXTREME CULD. MANY MATERIALS, SUCH AS CARBON STEEL, WILL BECOME BRITTLE AND MAY FRACTURE WHEN EXTREMELY COLD. DO NOT TOUCH COLD PIPING. AS FROSTBITE MAY OCCUR. ALL GAUGES, VALVES, REGULATORS, PIPING AND EQUIPMENT TO BE USED IN OXYGEN SERVICE MUST BE CLEANED FOR DXYGEN SERVICE IN ACCORDANCE WITH COA PAMPHLET G-4.1.

DOT PLACARD: OXYGEN

DOT PROPER SHIPPING NAME: OXYGEN, REFRIGERATED LIQUID

MISCELLAMEDUS INFURMATION:

FURTHER INFORMATION ABOUT LIQUID OXYGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON: VA 22232 (703) 979-4341

G-4.3: "COMMODITY SPECIFICATION FOR CXYGEN"

AIR LIDUIDE AMERICA CORPORATION P. 0. BOX 3047 HOUSTON, TX 77253

PRODUCT NAME OXYGEN. PEFRIĞERATED LIQUID

G-4: "OXYGEN"
G-4.1: "CLEANING FOUIPMENT FOR OXYGEN SERVICE"
P-1: "SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"
P-12: "SAFE HANDLING OF CRYDGENIC LIQUIDS"
P-14: "ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGEN-DEFICIENT ATMOSPHERES"
SB-8: "USE OF GXY-FUEL GAS WELDING AND CUTTING APPARATUS"
AV-8: "CHARACTERISTICS AND SAFE HANDLING OF CRYDGENIC LIQUID AND GASEDUS GXYGEN"

NFPA KATINGS:
HEALTH:
FLAMMABILITY:
OREACTIVITY:
OREACTIVE
OREACTIVE
OREACTIVE
OREACTIVE
OREACTIVE

THIS PRODUCT SAFETY DATA SHEET IS DEFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, INVESTIGATION, IN COMPLIANCE WITH HAZARD COMMUNICATION STANDARD 29 OFR 1900.1200. AIR LIQUIDE AMERICA CORPORATION PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED.

PUNCHASE DROFR MASTERCARD GROER

MATERIAL SAFETY DAIA SHEET

I-GENERAL INFORMATION

PRODUCT NAME OXYGEN

EMERGENCY TELEPHONE NO. 713-358-0302 MANUFACTURERS NAME AIR LIGHIDE AMERICA CORP. TRADE NAME/SYNONYMS CXYGEN: OXYGEN HSP: AVIATORS BREATHING OXYGEN (ABO) CHEMICAL NAME AND SYNONYMS

ÖXŸĞEN REVISION DATE: 09/05/89 CHEMICAL FAMILY GXTOIZER

PRODUCT 10. UN 1072 FORMULA 02 CAS FAMILY 7782-44-7

MSDS INFORMATION NUMBER: (713) 696-2140

I I - H A Z A R D D U S I N G R E D I E N T S

HAZAROGUS MIXTURES OF LIQUIDS AND GASES 0/0 TLV

OXYGEN NONE ESTABLISHED

100 **

ATAC 10012YHSIC01DATA

BOILING POINT -297.3F (-183.0C) & 1 ATM SPECIFIC GRAVITY (AIR = 11: 1.1349 # 70F (21.1C) & 1 ATM VAPOR PRESSURE N/A PERCENT VOLATILE BY VOLUME (J/O) N/A (GAS) DENSITY 0.08279 LB/CU FT # 70 F (21.1 C) & 1 ATM EVAPORATION RATE N/A (GAS) SOLUBILITY IN MATER 4.89SCC/100CC H20 & 32 F (0 C) MATERIAL AT NORMAL CONDITION GAS EXPANSION RATIO (LIQUID TO GAS) N/A (GAS)

APPEARANCE AND ODOR

COLORLESS, COORLESS, TASTELESS GAS

IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT N/A
FLASH POINT (METHOD USED)
FLAMMABILITY LIMITS IN AIR (D/O BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMABLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

THOUGH NOT FLAMMABLE ITSELF. DXYGEN VIGOROUSLY ACCELERATES COMBUSTION. IF POSSIBLE. SHUT DFF DXYGEN GAS AND REMOVE CYLINDERS FROM FIRE AREA OR COOL WITH WATER TO AVOID EXCESSIVE PRESSURE BUILD UP.

UNUSUAL FIRE AND EXPLOSION HAZARD

MATERIALS WHICH DO NOT BURN IN AIR MAY BURN IN AN OXYGEN-

ATR LIQUIDE AMÉRICA CURPORATION > P.O. BOX 3047 HOUSIEN. IX 77253

PRODUCT NAME OXYGEN

ENRICHED ATMOSPHERE WHERE THE OXYGEN CONTENT EXCEEDS 21%. OXYGEN MAY FORM EXPLOSIVE CUMPOUNDS WHEN EXPOSED TO COMBUSTIBLE MATERIALS OR DIL. GREASE. AND OTHER HYDROCARBON MATERIALS. PRESSURE CAN BUILD UP DUE TO HEAT AND CYLINDER MAY EXPLOSE IF PRESSURE RELIEF DEVICES SHOULD FAIL TO BELIEVE PRESSURE.

V-HEAL-TH HAZARD DATA

THRESHOLD LIMIT VALUE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

SEE OVEREXPOSURE SECTION

CARCINUGENICITY

NOT LISTED BY LARC. NTP. OSHA

ROUTES OF EXPUSURE

INHALATION

EFFECTS OF OVEREXPOSURE

BREATHING 80% OR MORE GXYGEN AT ATMOSPHERIC PRESSURE FOR MORE THAN 4 FEW HOURS MAY CAUSE NASAL STUFFINESS. COUGH. SORE THROAT. CHEST PAIN AND BREATHING DIFFICULTY. BREATHING DXYGEN AT HIGHER PRESSUPE INCKEASES THE LIKELIHOOD OF AD-VERSE EFFECTS WITHIN A SHORTER TIME PERIOD. EXPOSURE TO CXYGEN AT HIGHER PRESSURES FOR PROLONGED PERIODS HAS BEEN FOUND TO AFFECT VISION. NEUROMUSCULAR COORDINATION AND ATTENTIVE POWERS.

TOXICOLOGICAL PROPERTIES:

AT NORMAL CONCENTRATION AND PRESSURE, EXYGEN POSES NO TOXI-CITY HAZARDS. HOWEVER. AT ELEVATED CUNCENTRATIONS AND PRES-SURES, OXYGEN MAY CAUSE ADVERSE EFFECTS (SEE ABOVE).

EMERGENCY AND FIRST AID PROCEDUKES

REDUCE OXYGEN PRESSURES TO I ATM AND/OR MOVE VICTIM INTO FRESH AIR.

RESCUE PERSONNEL SHOULD BE AWARE OF EXTREME FIRE HAZARDS ASSOCIATED WITH OXYGEN-ENRICHED ATMOSPHERES.

VI-REACTIVITY DATA

STABILITY STABLE

CONDITIONS TO AVOID

NONE .

INCOMPATABILITY (MATERIALS TO AVOID)

OXYGEN REACTS EXPLOSIVELY WITH ETHERS, ALCOHOLS, AND HYDRO-CARBON MATERIALS. KEEP OXYGEN CONTAINERS FREE OF OIL AND/OR GREASE.

HAZARDOUS DECOMPOSITION PRODUCTS

NONE .

HER 00497

AIR LIDUTDE AMERICA CORPURATION P. J. BOX 3047 HOUSIGN: TX 77253

PRODUCT NAME DXYGEN

HAZARDOUS PSEYMERIZATION WILL NOT BOOCUR

CONDITIONS TO AVOID

NUNE.

VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FROM AFFECTED AREA. SHUT CHE SOURCE DE DXYGEN IE POSSIBLE. VENTILATE AREA IN PREVENT CXYGEN-ENRICHED ATMOSPHERE. RÉMOVE SOURCES DE HEAT DR IGNI-TION. IE LEAKING FROM CONTAINER OR VALVE. CONTACT THE CLOSEST BIG THREE INDUSTRIES LUCATION. OR YOUR SUPPLIER.

WASTE DISPOSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL, SECURE THE CYLINDER AND DEOM DOWN SLOWLY TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

NUNE.

VENTILATION

NATURAL UR MECHANICAL WHERE GAS IS PRESENT -- *SEE NOTES*

PROTECTIVE GLOVES

IF USCO, MUST BE CLEAN AND GREASE FREE

EYE PROTECTION

SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING HIGH PRESSURE CYLINDERS.

OTHER PROTECTIVE EQUIPMENT

SAFETY SHOES WHEN HANDLING CYLINDERS.

******** SECTION NOTES ******

LOCAL EXHAUST: SUFFICIENT TO PREVENT DXYGEN-ENRICHED ATMOSPHERES OF OVER 21% OXYGEN.

IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STURING

STORE AND USE WITH ADEQUATE VENTILATION. OXGYEN IS HEAVIER THAN AIR AND LEAKING GAS COULD ACCUMULATE IN LOW AREAS OR CONFINED SPACES CAUSING AN OXYGEN-ENRICHED ATMOSPHERE. CYLINDERS SHOULD BE STORED UPRIGHT WITH VALVE PROTECTION CAP

DATA SHEET PPODUCT NAME OXYGEN RIAI SAFETY

IN PLACE AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. PROTECT CYLINDERS FROM PHYSICAL DAMAGE: DO NOT DRAG, ROEL, SLIDE, DR DROP. USE A SUITABLE HAND TRUCK FOR LYLINDER MOVEMENT. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 125 H (52 C). DO NOT STORE CXYGEN CLUSER THAN 20 FEFT FROM FLAMMABLE OR COMBUSTIBLE MATERIALS. KEEP CYLINDERS FREE FROM SIL AND GREASE.

D.O.T. LABELING

CXYGEN --- YELLOW LABEL

VALVE CONNECTION

CGA 540 OR CGA 370 (PIN INDEXED)

OTHER PRECAUTIONS

ALL GAUGES, VALVES, REGULATORS, PIPING AND EQUIPMENT TO BE USED IN CXYGEN SERVICE MUST BE CLEANED FOR CXYGEN SERVICE IN ACCORDANCE WITH CGA PAMPHLET G-4.1. DXYGEN IS NOT TO BE USED AS A SUBSTITUTE FOR COMPRESSED AIR. NEVER STRIKE A WELDING ARC ON ANY COMPRESSED GAS CYLINDER. REFILLING CYLINDERS WITHOUT THE CONSENT OF THE CYLINDER OWNER IS A VIOLATION OF FEDERAL LAW (49 CFR).

DOT PLACARD: OXYGEN

ÕOT PROPER SHIPPING NAME: DXYGEN. CGMPRESSED

MISCELLANEOUS INFORMATION:

FURTHER INFORMATION ABOUT DXYGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON. VA 22202 (703) 979-4341

"COMMODITY SPECIFICATION FOR GXYGEN" G-4.3:

G-4:1: G-4:1: P-1:

2

"COMMODITY SPECIFICATION ...
"OXYGEN"
"CLEANING EQUIPMENT FOR OXYGEN SERVICE"
"SAFE CLEANING OF COMPRESSED GASES IN CONTAINERS"
"ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGENDEFICIENT ATMOSPHERES"
"USE OF OXY-FUEL GAS WELDING AND CUTTING APPARATUS"
"CHARACTERISTICS AND SAFE HANDLING OF CRYOGENIC
LIQUID AND GASEOUS OXYGEN" SB-8:

:B-VA

NEPA RATINGS: HEALTH: FLAMMABILITY: REACTIVITY:

HMIS RATINGS: HEALTH: FLAMMABILITY: REACTIVITY:

CERCLA RATINGS: HEALTH: О FIRE: RÉACTIVITY: PERSISTANCE:

LISTED IN TSCA INVENTORY: YES

ATM LIQUIDE AMERICA COPPERATION P. 0. BOX 3047 HOUSTON. IX 77253

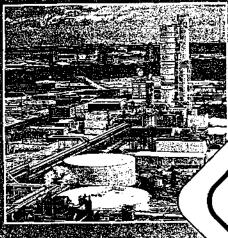
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PRODUCT NAME DXYGEN A SAFETY DATA SHEET

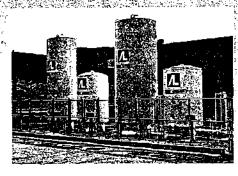
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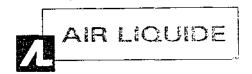




SAFETY PRECAUTIONS







HOW TO SAFELY
HANDLE AND USE
LIQUEFIED AND
COMPRESSED GASES

HER 00501

SAFETY PRECAUTIONS

xygen, nitrogen, argon, helium, compressed air, carbon dioxide, nitrous oxide, hydrogen, acetylene, and specialty gases have properties that can cause serious accidents, injuries, and even death if proper precautions and safety practices are not followed. Always use information found in Material Safety. Data Sheets (MSDS) and the applicable safety stappards as well as literature listed in a his door later the annual ingland. Stippard seas as a first equipments.

THIS SAFETY PRECAUTION
PAMPHLET IS OFFERED SOLELY FOR
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NO RESPONSIBILITY FOR THE
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THE DATA CONTAINED HEREIN.

and the state of t

THE FOLLOWING PROCEDURES SHOULD BE OBSERVED WHEN HANDLING COMPRESSED GAS CYLINDERS OR LIQUEFIED GAS CONTAINERS.



Read the label on all cylinders or containers before use to identify their contents. If the label is not legible or is missing, do not assume that the cylinder contains a particular gas, but return the cylinder to the gas supplier.

NEVER RELY ON THE COLOR OF THE CYLINDER TO IDENTIFY ITS CONTENTS.





Observe all warnings and safety precautions set forth on the cylinder label.



Always secure cylinders in storage and use. Never remove the valve protection cap until the cylinder is secured (chained, tied, etc.) and ready for use.





Never attempt to lift a cylinder by the valve protection cap.



Never attempt to transfer any gas from one cylinder to another or to mix any gases in a cylinder.



Always use a pressure-reducing regulator when withdrawing any gaseous product from a cylinder or other high pressure source. To minimize the chance of injury, stand to one side of the regulator when opening the cylinder valve.



Containers of liquefied compressed gases such as oxygen, nitrogen, argon, helium, hydrogen, carbon dioxide, and nitrous oxide must be kept in an upright position and secured to prevent them from being knocked over.

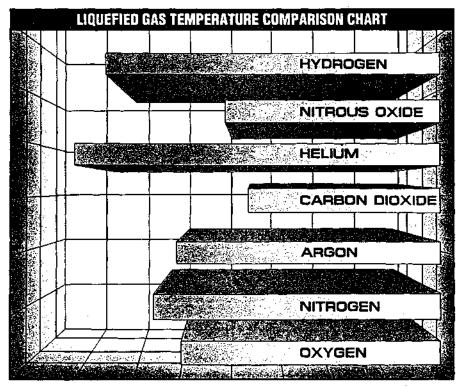


Never use an adaptor to connect a cylinder valve to a regulator or other piece of equipment. Specific valve outlet connections have been designed for most gases to prevent misuse and contamination. For further information, see CGA



Always use a cart when moving cylinders or liquelied gas containers.

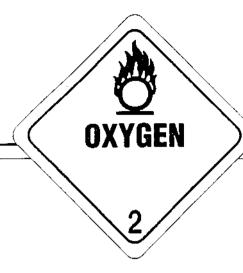
(Compressed Gas Association) / ANSI (American National Standards Institute) pamphlet V-1, "Compressed Cylinder Outlet and Inlet Connections".





Liquefied gases are extremely cold and these liquids or their cold "boil-off" vapors can

cause cold contact burns or "frostbite". In addition, many materials such as carbon steel will become brittle and may fracture when exposed to these cold temperatures. Piping for these cold liquids must be designed for extreme cold.



SAFETY PRECAUTIONS FOR OXYGEN:

xygen (0₂) is a colorless, odorless, and tasteless, nonflammable gas. It makes up about 21% of our atmosphere. Many substances which do not normally burn in air, and other substances which are combustible in air, may burn violently when in an oxygen-enriched atmosphere (GREATER THAN 23.5% OXYGEN) Do not permit smoking or open flames in any area where oxygen is stored, bandled or used. Geen oxygen

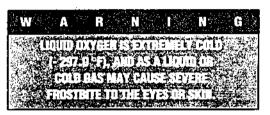
open flames in any area where oxygen is since by named in any area where oxygen is since by named in a sin

midalini sistema ana anti anjesio.

W A R N I N G
WHILE DXYGEN IS MONFLAMMABLE, ITSUPPORTS AND CAN EREATLY ACCELERATE
COMBUSTION: KEEP COMBUSTIBLES AND
JESHTJON SOURCES AWAY FROM WIGERE
OXYGEN IS BEING USED OR STORED.

KEEP ALL SURFACES WHICH MAY COME IN CONTACT WITH OXYGEN CLEAN TO PREVENT IGNITION.

Even normal industrial soot and dirt can constitute a combustion hazard in the presence of oxygen. Do not place liquid oxygen equipment on asphalt or on any surface which may have oil or grease deposits. If liquid oxygen is spilled, do not walk on or roll equipment over the spill. Use cleaning agents which will not leave organic deposits on the cleaned surfaces. In handling equipment which may come in contact with oxygen, use only clean, lint-free gloves or hands washed clean of oil. Never lubricate oxygen valves, regulators, gauges, or fittings with oil, grease, or other lubricants that are not oxygen compatible. Check with your lubricant manufacturer or oxygen supplier for a source of oxygen compatible lubricants.



Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid oxygen occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Always handle liquid so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed, and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside of boots or work shoes to shed spilled liquid. If clothing should be splashed with liquid oxygen or otherwise saturated with oxygen gas, it should not be considered safe to wear for at least 30 minutes, since it can be easily ignited while the concentrated oxygen remains.

LIQUID-TO-GAS EXPANSION

Cryogenic liquids produce large quantities of gas when they vaporize. Liquid oxygen will expand at a ratio of 1:860, liquid to gas. If liquid oxygen is trapped in a sealed container or piping, it will vaporize producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible oxygen enriched atmospheres or reduced visibility. In addition, all sources of ignition should be shut off in the path of the oxygen vapor cloud, if possible.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

STORE OXYGEN CYLINDERS AND LIQUEFIED OXYGEN CONTAINERS IN ACCORDANCE WITH APPLICABLE SAFETY CODES.

Oxygen in storage must be separated from flammable liquids or gases and combustible materials (especially oil or grease), a minimum distance of 20 feet unless separated by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least one-half hour. For more information, see NFPA Standard No. 50, "Bulk Oxygen Systems At Consumer Sites".

MAINTAIN ADEQUATE VENTILATION.

Adequate ventilation must be provided to prevent accumulation of oxygen and minimize combustion hazards in areas where oxygen is used and stored.

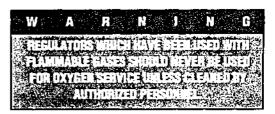
CONTAINERS, EQUIPMENT, AND REPLACEMENT PARTS MUST BE SUITABLE FOR OXYGEN SERVICE.

Use only equipment, cylinders, containers and apparatus designed and approved for use with oxygen. Many materials, especially some non-metallic gaskets and seals, constitute a combustion hazard when in oxygen service, although they may be acceptable for use with other gases. Make no substitutions for recommended equipment, and be sure all replacement parts are compatible with oxygen and cleaned for oxygen service. Keep repair parts in sealed, clean plastic bags until ready for use.

REGULATORS

Before attaching a regulator to a cylinder, visually inspect the cylinder valve outlet very carefully for traces of dirt, dust, oil or grease. Remove dirt and dust with a clean cloth, but if oil or grease is detected, do not use the cylinder: return it to your supplier. Before attaching the regulator to the cylinder valve, crack the cylinder valve momentarily to blow out any dust or

dirt that might have accumulated in the valve outlet. Visually inspect the regulator and the inlet connection to ensure that they are free of dirt, oil, grease or other hydrocarbon-type contaminants. These contaminants may ignite and burn violently when the cylinder valve is opened. Dirt and dust should be removed with a clean cloth. However, oil and grease cannot be easily removed, and the regulator should be returned to an authorized service facility for proper cleaning. Connect the regulator to the valve, back out the pressure-adjusting screw until it turns freely, open the cylinder valve slowly until maximum pressure is indicated on the high pressure gauge, then open the cylinder valve all the way to eliminate possible leaks through the packing. To minimize the chance of injury, stand to one side of the regulator when opening the cylinder valve.



OBSERVE ALL APPLICABLE SAFETY CODES WHEN INSTALLING OXYGEN EQUIPMENT.

Follow the recommendations of the NFPA Standard No. 50, "Bulk Oxygen Systems at Consumer Sites", NFPA Standard No. 51, "Oxygen-Fuel-Gas Systems for Cutting and Welding", American National Standards Institute Pamphlet No. Z49.1, "Safety In Welding and Cutting", and with all local safety codes when installing oxygen equipment or oxygen piping.

OXYGEN FOR MEDICAL USE

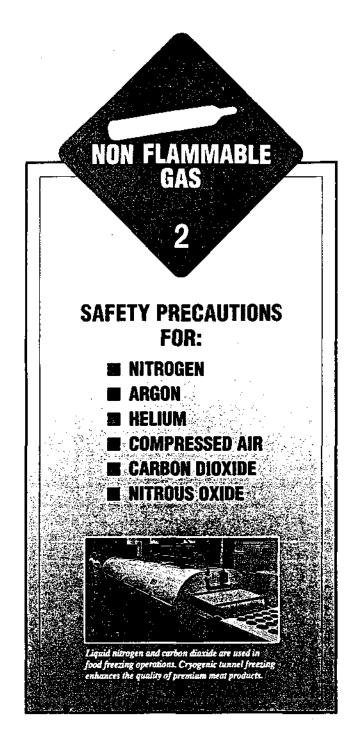
Oxygen should be used for medical use only if it is labeled: "Oxygen U.S.P.", and it is administered by qualified persons; and, except in emergencies, under doctor's prescription.

For further information about medical gas systems, consult NFPA Standard No. 99, "Health Care Facilities".

Oxygen should never be substituted for breathing air when air supplied respiratory protection is used since regulators used in this service may contain substances which are not compatible with oxygen and may result in an explosion.

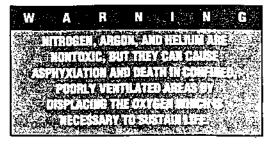
IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous oxygen should be released only outdoors away from personnel, combustible materials, and sources of ignition. Liquid oxygen should be dumped into an outdoor pit filled with clean, grease and oil-free gravel, where it will evaporate safely.



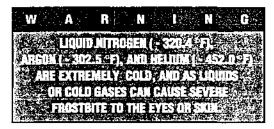
NITROGEN, ARGON, AND HELIUM SAFETY PRECAUTIONS

Nitrogen (N₂), argon (Ar), and helium (He) are inert, colorless, odorless, tasteless and nonflammable gases. The atmosphere that we breathe contains 21% oxygen, 78% nitrogen, 1% argon and trace amounts of other gases such as helium.



Atmospheres which do not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or even death,

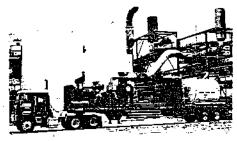
Nitrogen, argon, and helium cannot be detected by the human senses and will be inhaled like air. If adequate ventilation is not provided, these gases may displace normal air without warning. Store containers outdoors or in other well-ventilated areas. Never enter any tank, pit, or other confined area where these gases may be present until purged with air and tested for a breathable atmosphere (at least 19.5% oxygen) using an oxygen analyzer.



Do not touch frosted pipes or valves. If accidental eye or skin contact with cryogenic liquids occur, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Always handle liquid so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection. Wear cuffless trousers outside boots or over work shoes to shed spilled liquid.



High pressure mobile units respond to special applications for nitrogen and oxygen.

LIQUID-TO-GAS EXPANSION

Cryogenic liquids produce large quantities of gas when they vaporize. Liquid nitrogen will expand at a ratio of 1:696 liquid to gas, liquid argon will expand at a ratio of 1:842 liquid to gas, and liquid helium will expand at a ratio of 1:745 liquid to gas. If fiquid nitrogen, argon or helium is trapped in a sealed container or piping, it will vaporize producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible oxygen deficient atmospheres or reduced visibility.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

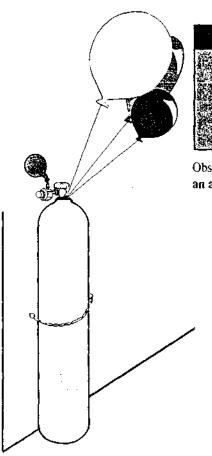
LIQUID HELIUM SPECIAL PRECAUTIONS

The extremely low temperature of liquid helium (- 452.0 °F) can solidify any gas including air. Such solidified gases can plug pressure-relief passages and devices making them ineffective in relieving excess pressure from evaporating fiquid. Always store and handle liquid helium under positive pressure and in closed systems to prevent infiltration and solidification of air or other gases.

Keep exterior surfaces of liquid helium equipment clean. Oxygen can condense from the air on exposed liquid helium or cold-gas equipment surfaces, such as vaporizers and piping. To prevent the possible ignition of grease, oil, or other combustible materials with the condensed oxygen, keep these surfaces clean.

IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous nitrogen, argon, or helium should be released only in an outdoor area. Liquid nitrogen, argon or helium should be released into an outdoor pit filled with clean, grease and oilfree gravel, where it will evaporate rapidly and safely.



HELIUM BALLOON WARNING

NELTIM BALLOOMS AND BALLOON FILLING EQUIPMENT ARE OFTEN MISUSED IN AN ATTEMPT TO ALTER VOICE CHARACTERISTICS BY INHALING HELIUM TO TALK LIKE "DONALD DUCK":

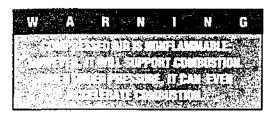
THIS IS AN EXTREMELY DANGEROUS PROCEDURE WHICH HAS RESULTED IN DEATHS THROUGH SUFFOCATION AND/OR LUNG DANAGE.

Observe the following precautions when handling helium cylinders for balloon filling. Don't let an accident spoil the fun of using helium filled balloons.

- Read and follow the safety precautions that appear on the cylinder label.
- Use only a regulator which is designed for balloon filling.
- Store and use helium cylinders in a well ventilated area, and transport cylinders only in well ventilated vehicles. Helium gas is odorless and non-toxic, but can cause suffocation by displacing the oxygen you breathe.
- Never remove the cylinder valve protection cap until the cylinder is secured (chained, tied, etc.) in an upright position and ready for use.
- Do not breathe helium from the cylinders, filling regulators or from helium filled balloons.
- 🕱 Never allow children to operate balloon filling equipment.
- Close the cylinder valve after each use and when empty.
- 8 Never leave the cylinder unattended with the regulator attached.



Compressed air is a colorless, odorless, tasteless and nonflammable gas that is produced by compression and filtration of atmospheric air or by synthetically mixing 21% oxygen and 79% nitrogen.



BREATHING AIR

When using compressed air for breathing, ensure that you have a source of air (cylinder or compressor) that meets or exceeds the specification for CGA "Grade D" air that is required by OSHA.



Fire fighters using breathing air in self-contained breathing apparatus (SCBA).

Oxygen should never be substituted for breathing air when airsupplied respiratory protection is used since regulators used in this service may contain substances which are not compatible with oxygen and may result in an explosion.

AIR FOR MEDICAL USE

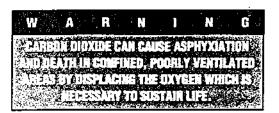
If air is used for medical purposes, then you must use a medical grade of air "Compressed Air U.S.P.".

SPECIAL PRECAUTIONS FOR COMPRESSED AIR

Compressed air is often used to power pneumatic tools. Under no circumstances should oxygen be substituted for air to power tools since these tools contain lubricants which are not oxygen compatible and could cause an explosion resulting in severe injury or death.



Carbon dioxide (CO₁) is a colorless, odorless and nonflammable gas with a slightly acidic taste.



Concentrations of 10% carbon dioxide or greater will cause unconsciousness or death, without regard to oxygen concentration. In addition to the asphyxiation hazard, carbon dioxide acts as a stimulant and depressant on the central nervous system. At lower concentrations, increases in heart rate and blood pressure have been noted, and labored breathing, headaches, and dizziness may occur if exposure is prolonged, regardless of oxygen content. OSHA has adopted an 8-hour Permissible Exposure Limit (PEL), also known as Time Weighted Average (TWA) of 5,000 ppm (0.5%) for carbon dioxide. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Short Term Exposure Limit (STEL) of 30,000 ppm (3%). Persons should not be permitted in areas with concentrations above these levels.

Carbon dioxide cannot be detected by the human senses and will be inhaled like air. If adequate ventilation is not provided, it may displace normal air without warning. Since carbon dioxide is more dense than air, high concentrations can persist in open pits, tanks, or low areas. Before entering any tank, pit, or other confined area where carbon dioxide may be present, carbon dioxide monitoring should be performed. If carbon dioxide is present, the area should be purged with air, or an air supplied respirator should be worn. Store containers outdoors or in other well-ventilated areas to avoid the accumulation of potentially harmful concentrations.

W A R N I N G
WHEN LIQUID CARBON DIOXEDE IS RELEASED TO
THE ATMOSPHERE, IT FORMS SOLID CARBON
DIOXIDE (DRY ICE) WHICH IS EXTREMELY
COLD (-109.3 °F) AND CAN CAUSE SEVERE
FROSTBITE TO THE EYES OR SKIN.

Do not touch frosted pipes or valves. If accidental eye or skin contact with cold gas or dry ice occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the

hody in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Protect your eyes with safety goggles and face shield, and cover the skin to prevent contact with the liquid, cold gas or solid. Protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection.

CARBON DIOXIDE SPECIAL PRECAUTIONS

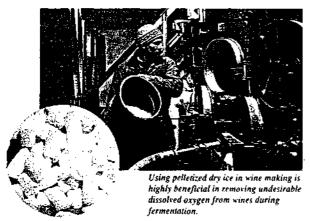
For small uses, carbon dioxide service is by withdrawal of gas from a cylinder. A small number of cylinders are equipped with a siphon or dip tube for liquid withdrawal. NEVER CONNECT A REGULATOR TO A CYLINDER EQUIPPED WITH A SIPHON OR DIP TUBE. The liquid will flash to gas and rupture the regulator. Cylinders equipped with siphon or dip tubes are identified by "siphon tube" stenciled on the cylinder sidewall.

SOLID CARBON DIOXIDE (DRY ICE) SPECIAL PRECAUTIONS

Dry ice is an extremely cold solid (-109.3 °F). Avoid contact with exposed flesh as it can cause severe frosbite. Wear suitable clothing and gloves when handling dry ice.

Dry ice evaporates (sublimes) to form carbon dioxide gas which does not support life. Do not breathe gas. Store and use dry ice with adequate ventilation.

Do not store dry ice in tight containers. Pressure will develop as the dry ice evaporates which could burst air tight containers.

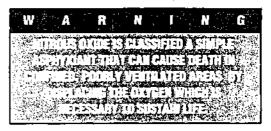


IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR SOLID, EXERCISE CAUTION.

Carbon dioxide gas should be released only in an outdoor, well ventilated area. Allow dry ice to sublime (evaporate from solid to gas) in an outdoor, well ventilated area.



Nitrous exide (N_2O) is a colorless and nonflammable gas with a slightly sweetish odor and taste. Nitrous exide is widely used as an anesthetic gas in concentrations of up to 50% with exygen.



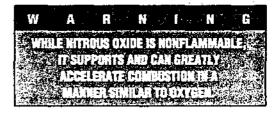
Atmospheres which do not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness and death. When nitrous oxide is inhaled in high concentrations for a few seconds, it affects the central nervous system and may induce symptoms resembling intoxication, hence its nickname "Laughing Gas".

W A R N I N G

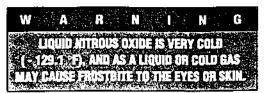
SECALSE OF ITS WIDELY KNOWN INTOXICATIONS
EFFECT: THIS GAS HAS OFTEN BEEN MISUSED
HESIN TIME IN DEATH DUE TO SUFFOCATIONS
IT IS IMPORTANT THAT SECURITY OF MITROUS
DIXIDE CYLLINDERS BE CONSIDERED TO

PREVENT THEFT AND MISUSE

Although nitrous oxide is classified as a simple asphyxiant (nontoxic), there are studies that suggest a link to certain health hazards from long-term exposure to high concentrations of nitrous oxide in the operating room or dental office. Because of these studies, the ACGIH (American Conference of Governmental Industrial Hygienists) has recommended a TLV of 50 ppm and the NIOSH (National Institute for Occupational Safety and Health) has recommended a maximum exposure on an 8-hour time weighted average (TWA) of 25 ppm for anesthesia administration and 50 ppm for dental offices. REFER TO YOUR MATERIAL SAFETY DATA SHEET FOR MORE DETAILED INFORMATION ON THE HEALTH HAZARDS OF NITROUS OXIDE.



Nitrous oxide in storage must be separated from flammable liquids or gases and combustible materials (especially oil or grease) a minimum distance of 20 feet unless separated by a noncombustible barrier at least 5 feet high having a fire rating of at least one-half hour.



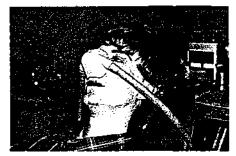
Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid nitrous oxide occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Always handle liquid nitrous oxide so that it will not splash or spill. Protect eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside of boots or work shoes to shed spilled liquid.

NITROUS OXIDE FOR MEDICAL USE

Nitrous oxide should be used for anesthetic purposes only if it is labeled "Nitrous Oxide, U.S.P.", and it is administered by licensed practitioners.



Nitrous Oxide is routinely used as an anesthetic gas in medical and dental applications.

IF IT IS NECESSSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous and liquid nitrous oxide should be released only outdoors, downwind from personnel, combustible materials and sources of ignition.



HYDROGEN SAFETY PRECAUTIONS

Hydrogen (H₂) is a colorless, odorless, tasteless, nontoxic and flammable gas. It is the lightest of all elements.



KEEP HYDROGEN AWAY FROM SOURCES OF IGNITION, AND DO NOT PERMIT ANY ACCUMULATION OF GAS.

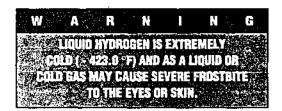
Because it is lighter than air, hydrogen has a tendency to accumulate in the upper portions of confined areas. Concentrations of hydrogen between 4% and 75% by volume in air are relatively easy to ignite by a low-energy spark and may cause an explosion. Smoking, open flames, sparks, unapproved electrical equipment, and other ignition sources must not be permitted in hydrogen areas. Store containers outdoors or in a well-ventilated area away from ignition sources, flammable materials and oxidizers such as oxygen and nitrous oxide.

KEEP EQUIPMENT AREA WELL VENTILATED.

Although hydrogen is nontoxic, it can cause asphyxiation in a confined area that does not have adequate ventilation. Hydrogen gas cannot be detected by human senses; and if adequate ventilation is not provided, may displace normal air without warning. Any atmosphere which does not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or even death. Store containers outdoors, or in other well ventilated areas. Never enter any tank, pit, or other confined area where hydrogen may be present until purged with air and tested to ensure that it has an oxygen content between 19.5% and 23.5%. In addition, the confined space must be tested to ensure that there are no flammable gases present that exceed 10% of their Lower Explosive Limit (LEL).

TAKE EVERY PRECAUTION AGAINST HYDROGEN LEAKS, ESCAPING HYDROGEN CANNOT BE DETECTED BY SMELL OR TASTE, HYDROGEN LEAKING UNDER PRESSURE CAN IGNITE DUE TO FRICTION AND WILL BURN WITH AN ALMOST INVISIBLE BLUE FLAME.

All hydrogen connections should be leak checked using a leak detection solution before use. NEVER USE A FLAME TO DETECT HYDROGEN LEAKS!



Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid hydrogen occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT SKIN AND EYES.

Always handle liquid hydrogen so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed, and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside boots or work shoes to shed spilled liquid.

LIQUID-TO-GAS EXPANSION

Cryogenic liquids produce large quantities of gas when they vaporize. Liquid bydrogen will expand at a ratio of 1:850, liquid to gas. If fiquid hydrogen is trapped in a seafed container or piping, it will vaporize, producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible flammable atmospheres or reduced visibility. In addition, all sources of ignition should be shut off in the path of the vapor cloud, if possible.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

LIQUID HYDROGEN SPECIAL PRECAUTIONS

The extremely low temperature of liquid hydrogen (- 423.0 °F) can solidify any gas except helium. Such solidified gases can plug pressure-relief passages and devices, making them ineffective in relieving excess pressure from evaporating liquid. Always store and handle liquid hydrogen under positive pressure and in closed systems to prevent infiltration and solidification of air or other gases.

Keep exterior surfaces of liquid hydrogen equipment clean. Oxygen can condense from the air on exposed liquid hydrogen or cold-gas equipment surfaces, such as vaporizers and piping. To prevent the possible ignition of grease, oil, or other combustible materials with the condensed oxygen, keep these surfaces clean.

NEVER USE CONTAINERS, EQUIPMENT, OR REPLACE-MENT PARTS OTHER THAN THOSE SPECIFICALLY DESIGNATED FOR USE IN HYDROGEN SERVICE.

Observe all applicable safety codes when installing hydrogen equipment.

Follow the recommendations contained in NFPA Standards 50A, "Gaseous Hydrogen Systems at Consumer Sites", and 50B, "Liquefied Hydrogen Systems at Consumer Sites", and with all local safety codes when installing hydrogen equipment or systems.

IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Liquid and gaseous hydrogen must be disposed of outdoors in an isolated area away from personnel, combustible materials, and ignition sources. Liquid hydrogen for disposal should be completely vaporized and the vapor vented in a safe manner. Remember that a flammable mixture will exist for some distance downwind of the disposal area. A shallow aluminum pan makes a suitable tlash evaporator for disposal of moderately small quantities of liquid hydrogen.



ACETYLENE SAFETY PRECAUTIONS

Acetylene (C_2H_2) is a colorless, non-toxic, flammable gas with a distinctive garlic-like odor.

W A R N I N G

ACETYLENE IS A FLAMMABLE GAS.
A MIXTURE OF ACETYLENE WITH DXYGEN OR
AIR IN A CONFINED AREA WILL EXPLODE IF
IGNITED BY A SPARK, PLAME OR OTHER
SOURCE OF IGNITION.

KEEP ACETYLENE AWAY FROM SOURCES OF IGNITION, AND DO NOT PERMIT ANY ACCUMULATION OF GAS.

Concentrations of acetylene between 2.5% and 81% by volume in air are relatively easy to ignite by low-energy sparks and may cause an explosion. Smoking, open flames, sparks, unapproved electrical equipment and other ignition sources must not be permitted in acetylene storage areas. Store cylinders outdoors or in other well ventilated areas away from ignition sources, other flammable materials, and oxidizers such as oxygen and nitrous oxide.

NEVER USE EQUIPMENT OR CYLINDERS THAT ARE LEAKING ACETYLENE

Be certain that the regulator-to-cylinder valve, hose-to-regulator and the torch-to-hose connections are leak tight by leak checking with a leak detection solution before starting work. NEVER USE A FLAME TO DETECT ACETYLENE LEAKS!

Regulators, hoses, and torches must be properly maintained to work correctly and safely. If an acetylene valve should leak around the cylinder-valve stem when the valve is opened, close the valve and tighten the packing gland nut. If this does not stop the leak, contact the supplier immediately.

DO NOT TAMPER WITH FUSIBLE METAL PRESSURE RELIEF DEVICES OR CYLINDER VALVES.

Acetylene cylinders are equipped with fusible metal pressure relief devices which melt at about 212 °F, the boiling point of water. These devices are designed to release the acetylene in the event of an abnormally high temperature, as in a fire. These fusible metal pressure relief devices are threaded into the top and/or bottom of most cylinders. Fusible-metal channels may also be provided in the valve body on smaller cylinders. Do not tamper with these fusible metal pressure relief devices or permit a torch flame to come in contact with them. Keep cylinders away from overhead and ground-level welding and cutting operations to prevent flying sparks and slag from accumulating on or around the cylinder which could cause fusible metal pressure relief devices to melt, releasing acetylene which could be ignited.

Protect all cylinders from falling objects and avoid rough handling of cylinders to prevent damage to the fusible plugs or cylinder valves. Always store, transport, and use acetylene cylinders in a vertical position.

KEEP EQUIPMENT AREA WELL VENTILATED

Although acetylene is nontoxic, it is an anesthetic and can cause asphyxiation in a confined area that does not have adequate ventilation. Any atmosphere which does not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or death. If adequate ventilation is not provided, acetylene may displace normal air. Acetylene can be detected by its distinctive garlic-like odor. If the odor of acetylene is noticed, immediately attempt to locate the source of the leak and correct it. If a leak in a cylinder or connected apparatus cannot be stopped safely, contact the gas supplier. If possible, the cylinder should be moved to a well ventilated area away form possible ignition sources. Never store, use, or transport acetylene cylinders in confined or unventilated spaces, such as cabinets, closets, tool boxes, and especially in automobile trunks.

ACETYLENE SPECIAL PRECAUTIONS

W A R N I N G
ACETYLENE USED AT PRESSURES GREATER,
THAN 15 PSIG IS EXTREMELY UNSTABLE AND
MAY DECOMPOSE VIOLENTLY.

Always use a regulator designed for acetylene use. Never adjust the acetylene regulator to obtain a delivery pressure greater than 15 psig. Never open an acetylene cylinder valve more than one complete turn.



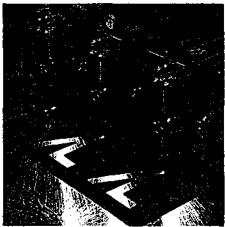
Under certain conditions, acetylene forms readily explosive compounds with copper, silver, and mercury. Contact should be avoided between acetylene and these metals, their salts, compounds, and high concentration alloys.

Acetylene cylinders differ from all other compressed gas cylinders in that they are packed with a porous mass that is saturated with a solvent, usually acetone. During the filling process acetylene gas is dissolved into this solvent to avoid the decomposition characteristics of gaseous acetylene.

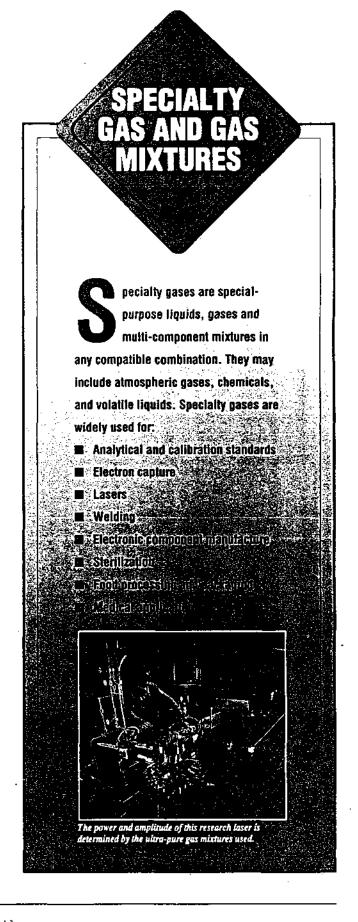
Never under any circumstances, attempt to transfer acetylene from one cylinder to another or to mix any gas with acetylene in a cylinder.

OBSERVE ALL APPLICABLE SAFETY CODES WHEN USING ACETYLENE.

Follow the recommendations found in ANSI Standard Z49.1, "Safety in Welding and Cutting", and NFPA Standard No. 51. "Oxygen-Fuel Gas Systems for Welding and Cutting" before installing or using equipment and cylinders in acetylene service.



An automated oxy-acetylene cutting machine.



SPECIALTY GAS AND GAS MIXTURES SAFETY PRECAUTIONS



W A R N I N G

MANY SPECIALTY GASES (INCLUDING
MOXITIES) HAVE FLAMMABLE, TOXIC,
CORRESSIVE, OXIDIZING, PYROPHORIC, AND
OTHER HAZARISHS PROPERTIES. THESE GASES
CAN CAUSE PROPERTY DAMAGE, AS WELL AS
SERIOUS OR FATAL INJURIES IF PROPER SAFETY
PRECAUTIONS ARE NOT FOLLOWED.

INHALATION OF SOME TOXIC SPECIALTY GASES CAN BE FATAL IN VERY LOW CONCENTRATIONS WHILE OTHERS CAN CAUSE SPECIFIC ORGAN DAMAGE AFTER REPEATED EXPOSURE.

In addition, some specialty gases can cause simple asphyxiation by displacing the oxygen in the atmosphere, while corrosive gases can cause serious eye or skin damage upon contact; and flammable gases can present fire and explosion hazards.



Highly precise reference gas for scientific instrumentation.

OBTAIN SAFETY INFORMATION BEFORE HANDLING SPECIALTY GASES

Because of the great number of specialty gases and gas mixtures available, and the variety of hazardous properties of these gases, it is not possible to cover all safety precautions for specialty gases in this pamphlet. If you are not familiar with the handling of specialty gases and their hazardous properties, contact your supplier. Also available are Material Safety Data Sheets (MSDS) presenting the hazardous properties and safe handling procedures for each specialty gas.

READ THE PRECAUTIONARY LABEL ON THE CYLINDER.

READ THE LABEL TO IDENTIFY THE GAS!



This is an important warning applying to all gas cylinders, but it is particularly important for specialty gases because of their unique and varied hazardous properties.

Users of specialty gases are urged to be certain that employees read and follow the precautionary information on all gas cylinder labels. If a cylinder is received with missing, damaged, or illegible precautionary labels, do not use the cylinder, call your gas supplier.

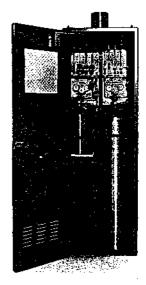
DO NOT PERMIT UNTRAINED PERSONS TO HANDLE SPECIALTY GASES.

Because of the extremely hazardous properties of some specialty gases and their applications, employees must be trained in their safe handling and use.

SPECIAL PRECAUTIONS

When two or more gases, or liquefied gases are mixed, their properties may combine to create additional hazards. Obtain and evaluate the safety information for each component and for the mixture before use.

Special handling and storage precautions must be taken when working with toxic, pyrophoric or corrosive specialty gases. Because of their hazardous nature, many gases may require the use of special personal protective equipment such as respirators, chemical resistant gloves and clothing and nearby eye wash and safety showers.



In many instances Federal. State or local fire codes and regulations may govern or restrict the handling and storage of these gases. One safe usage alternative is the use of a cylinder gas storage cabinet (left). These fully enclosed units will normally hold from one to four cylinders. The cabinets are designed to permit air changes with an exhaust system that will safely carry away any inadvertently released product and many are equipped with leak detection and fire suppression systems. The cabinets can be set up to

be fully automated or operated manually with little or no potential exposure to personnel.

IF NECESSARY TO DISPOSE OF WASTE GAS, EXERCISE EXTREME CAUTION.

No attempt should be made to dispose of any gas mixtures before determining the following:

- 1. What gases are in the mixture?
- 2. At what concentrations are they present?
- 3. What is the total quantity for disposal?
- 4. Is the mixture subject to environmental regulations?

In many cases, sophisticated and expensive scrubbing equipment is necessary to destroy residual gases. It is best to return the unused portion of any gas or gas mixture to your supplier for disposal.

DISCLAIMER

THIS SAFETY PRECAUTION PAMPHLET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. THE COMPANY PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

ADDITIONAL INFORMATION



For further technical information about any of these gases or other unlisted gases refer to the "Material Safety Data Sheet" (MSDS), the Air Liquide "Encyclopedie Des Gaz", or to the Air Liquide America video "Hazards of Liquefied and Compressed Gases."



Additional product information about these and other gases can be found in publications and videos produced by the Compressed Gas Association (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, Virginia, ZIP 22202, Tel.: 1 (703) 412-0900.

G-1	"Acetylene"
G-1.1	"Commodity Specification for Acetylene"
G-4	"Oxygen"
G-4.1	"Cleaning Equipment for Oxygen Service"
G-4.3	"Commodity Specification for Oxygen"
G-5	"Hydrogen"
G-5.3	"Commodity Specification for Hydrogen"
G-6	"Carbon Dioxide"
G-6.2	"Commodity Specification for Carbon Dioxide"
G-7	"Compressed Air for Human Respiration"
G-7.1	"Commodity Specification for Air"
G-8.2	"Commodity Specification for Nitrous Oxide"
G-9.1	"Commodity Specification for Helium"
G-10.1	"Commodity Specification for Nitrogen"
G-11.1	"Commodity Specification for Argon"
P-1	"Safe Handling of Compressed Gases in Containers"
P-2	"Characteristics and Safe Handling of Medical Gases"
P-g	"The Inert Gases Argon, Nitrogen and Helium"
P-12	"Safe Handling of Cryogenic Liquids"
P-14	"Accident Prevention in Oxygen-Rich and
	Oxygen-Deficient Atmospheres"
SB-2	"Oxygen-Deficient Atmospheres"
\$B-4	"Handling Acetylene Cylinders in Fire Situations"
\$B-8	"Use of Oxy-Fuel Gas Welding and Cutting Apparatus"
SB-14	"Helium Gas for Filling Balloons"
ÄV-1	"Safe Handling and Storage of Compressed Gases"
AV-4	"Characteristics and Safe Handling of Medical Gases"
AV-5	"Safe Handling of Liquefied Nitrogen and Argon"
AV-6	"Highway Transportation of Gases"
ĀV-7	"Characteristics and Safe Handling of Carbon Dioxide"
AV-8	"Characteristics and Safe Handling of Cryogenic Liquid
	and Gaseous Oxygen"
AV-9	"Handling Acetylene Cylinders in Fire Situations"

IN THE EVENT OF AN EMERGENCY INVOLVING ANY TYPE OF GAS, CALL THE FOLLOWING EMERGENCY RESPONSE TELEPHONE NUMBER FOR THE AREA IN WHICH THE EMERGENCY HAS OCCURRED.

These Emergency Response telephone numbers also appear on all Air Liquide America shipping papers.

IN TEXAS, OKLAHOMA, and LOUSIANA... Call the Air Liquide America Operations Control Center in Houston, Texas: 1 (800) 364-7378

IN ALL OTHER STATES... Call CHEMTREC: 1 (800) 424-9300

AIR LIQUIDE AMERICA EMERGENCY RESPONSE TEAM LOCATIONS



Responsible Care*
A Public Commitment

PRIMARY RESPONSE TEAMS

- Œ Houston, TX Œ Bayport, TX
- te Dallas, TX
- № Fremont, CA Long Beach, CA
- Tualatin, OR
- ☑ Chicago, IL ☑ Morrisville, PA

SECONDARY RESPONSE TEAMS

- & Austin, TX & Corpus Christi, TX
- € Odessa, TX E Lubbock, TX
- ₩ Borger, TX © Beaumont, TX
- E Beaumont, TX
 E Tulsa, OK
 E Phoenix, AZ
- K Anchorage, AK

AIR LIQUIDE AMERICA GASES SUPPLIED BY:



AIR LIQUIDE AMERICA

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MOST EFFICIENT, ON-TIME PROFESSIONAL SUPPLIER

Please answer the questions below.

Detach and drop in the mail today.

We'll pay the postage.

Please help us by completing the following information for our delivery to you. Your comments are valuable and will help us to improve delivery service. Thank You.

Based on a scale of 1 to 4 (with 4 being Extremely Satisfied, and 1 being Extremely Unsatisfied), please rate our performance in the following areas specifically as they pertain to the delivery. The more specific information you provide, the better we can serve your needs.

Ease of placing order?	Extremely Dissatisfied 1	Dissatisfied 2	Satisfied 3	Extremely Satisfied
Product delivered on time?				. 🗀
Driver courteous, neat and professional?				
Vehicle clean and appears well-maintained?				
Delivery performed to your expectations?				
Paperwork requirements met?				
Comments/Suggestions:			·	
Company:				
Your Name (optional):	·			
Telephone:	AIR LIQUIDE			

$\frac{2}{3}$ coveralls $\frac{2.85}{5.70}$ $\frac{5.70}{5.25}$ $\frac{5.25}{33.45}$	'-X	2.25 2.85 1.75	5.25	•
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